

WHAT IS CLAIMED AS NEW AND IS DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

1. An automated chemical synthesizer comprising:

plural reaction vessels;

5 a plurality of liquid containers configured to contain
liquid chemicals respectively;

at least one liquid dispenser configured to dispense the
liquid chemicals from the plurality of liquid containers to
said plural reaction vessels according to a synthesizing
10 protocol;

a liquid amount storage configured to memorize a present
amount of each of the liquid chemicals in the plurality of
liquid containers;

15 a dispensing amount calculator configured to calculate a
dispensing amount of each of the liquid chemicals to be
dispensed according to the synthesizing protocol; and

a liquid shortage detector configured to detect shortages
of the liquid chemicals in the plurality of liquid containers
by comparing the present amount memorized in the liquid amount
storage and the dispensing amount calculated by the dispensing
20 amount calculator.

2. An automated chemical synthesizer according to Claim
1, wherein the liquid amount storage is configured to memorize
an original amount of each of the liquid chemicals in the
25 plurality of liquid containers when the plurality of liquid
containers are set in the automated chemical synthesizer.

3. An automated chemical synthesizer according to Claim 1, wherein the plurality of liquid containers are positioned so as to correspond to position addresses respectively, and wherein the liquid amount storage is configured to memorize the present amount of each of the liquid chemicals in the plurality of liquid containers corresponding to each of the position addresses.

4. An automated chemical synthesizer according to Claim 1, wherein the dispensing amount calculator is configured to calculate the dispensing amount and the liquid shortage detector is configured to detect the shortages of the liquid chemicals before the synthesizing protocol is carried out.

5. An automated chemical synthesizer according to Claim 1, wherein the dispensing amount calculator is configured to calculate the dispensing amount and the liquid shortage detector is configured to detect the shortages of the liquid chemicals after the synthesizing protocol starts to be carried out but before the at least one dispenser dispenses the liquid chemicals whose shortages are to be detected.

6. An automated chemical synthesizer according to Claim 1, wherein the synthesizing protocol comprises a plurality of dispensing processes, the dispensing amount calculator is configured to calculate an accumulated dispensing amount by accumulating the dispensing amount of each of the liquid chemicals to be dispensed in each of the plurality of dispensing processes, and wherein the liquid shortage detector

is configured to detect, every time the dispensing amount is accumulated, the shortages of the liquid chemicals by comparing the present amount memorized in the liquid amount storage and the accumulated dispensing amount calculated by the dispensing amount calculator.

7. An automated chemical synthesizer according to Claim 1, wherein the synthesizing protocol comprises a plurality of dispensing processes, the dispensing amount calculator is configured to calculate an accumulated dispensing amount by accumulating the dispensing amount of each of the liquid chemicals to be dispensed in each of the plurality of dispensing processes, and wherein the liquid shortage detector is configured to detect, after the dispensing amount calculator calculates the accumulated dispensing amount by accumulating the dispensing amount of each of the liquid chemicals to be dispensed in all of the plurality of dispensing processes, the shortages of the liquid chemicals by comparing the present amount memorized in the liquid amount storage and the accumulated dispensing amount calculated by the dispensing amount calculator.

8. An automated chemical synthesizer according to Claim 1, wherein the liquid shortage detector is configured to calculate a difference by subtracting the dispensing amount calculated by the dispensing amount calculator from the present amount memorized in the liquid amount storage and

configured to determine the shortages occur when the difference is smaller than zero.

9. An automated chemical synthesizer according to Claim 8, wherein the synthesizing protocol comprises a plurality of dispensing processes, and wherein the liquid shortage detector is configured to detect the shortage of each of the liquid chemicals every time the dispensing amount in each of the plurality of dispensing processes is calculated.

10. An automated chemical synthesizer according to Claim 1, further comprising:

a liquid shortage prevention section configured to notify an operator that the shortage will occur when the liquid shortage detector detects the shortages.

11. An automated chemical synthesizer according to Claim 1, wherein the liquid chemicals comprise at least one reagent and at least one solvent.

12. An automated chemical synthesizer according to Claim 11, wherein said at least one liquid dispenser is configured to dispense the solvents and reagents to said plural reaction vessels.

13. An automated chemical synthesizer according to Claim 11, wherein said at least one liquid dispenser comprises:

a first liquid dispenser configured to dispense the reagents to said plural reaction vessels; and

a second liquid dispenser configured to dispense the solvents to said plural reaction vessels.

14. An automated chemical synthesizer according to Claim 1, wherein some of the plurality of liquid containers contain same liquid among the liquid chemicals and the at least one liquid dispenser is configured to dispense said same liquid from any one of said some of the plurality of liquid containers, and wherein the liquid shortage detector is configured to detect the shortages of said same liquid based on a total amount of said same liquid stored in all of said some of the plurality of liquid containers.

15. An automated chemical synthesizer according to Claim 1, wherein the liquid shortage detector is configured to detect the shortages in all of the plurality of liquid containers.

16. An automated chemical synthesizer according to Claim 1, wherein the liquid shortage detector is configured to detect the shortages in a part of the plurality of liquid containers.

17. An automated chemical synthesizer according to Claim 1, wherein the liquid shortage detector is configured to detect the shortages both before and while the synthesizing protocol is carried out.

18. An automated chemical synthesizer according to Claim 1, wherein the liquid shortage detector is configured to detect the shortages either before or while the synthesizing protocol is carried out.

19. An automated chemical synthesizer comprising:

plural reaction vessels;

a plurality of liquid containers for containing liquid chemicals respectively;

liquid dispensing means for dispensing the liquid chemicals from the plurality of liquid containers to said plural reaction vessels according to a synthesizing protocol;

liquid amount storage means for memorizing a present amount of each of the liquid chemicals in the plurality of liquid containers;

dispensing amount calculation means for calculating a dispensing amount of each of the liquid chemicals to be dispensed according to the synthesizing protocol; and

liquid shortage detecting means for detecting shortages of the liquid chemicals in the plurality of liquid containers by comparing the present amount memorized in the liquid amount storage means and the dispensing amount calculated by the dispensing amount calculation means.

20. A liquid shortage detecting system for an automated chemical synthesizer in which at least one liquid dispenser is configured to dispense the liquid chemicals from a plurality of liquid containers to a plurality of reaction vessels according to a synthesizing protocol, the system comprising:

a liquid amount storage configured to memorize a present amount of each of the liquid chemicals in the plurality of liquid containers;

a dispensing amount calculator configured to calculate a dispensing amount of each of the liquid chemicals to be dispensed according to the synthesizing protocol; and

a liquid shortage detector configured to detect shortages of the liquid chemicals in the plurality of liquid containers by comparing the present amount memorized in the liquid amount storage and the dispensing amount calculated by the dispensing amount calculator.

21. A method for detecting liquid shortages in an automated chemical synthesizer in which at least one liquid dispenser is configured to dispense the liquid chemicals from a plurality of liquid containers to a plurality of reaction vessels according to a synthesizing protocol, the method comprising:

memorizing a present amount of each of the liquid chemicals in the plurality of liquid containers;

calculating a dispensing amount of each of the liquid chemicals to be dispensed according to the synthesizing protocol; and

detecting shortages of the liquid chemicals in the plurality of liquid containers by comparing the present amount memorized in the liquid amount storage and the dispensing amount calculated by the dispensing amount calculator.